

e-Operations Workshop
Atlanta 6 December 2007

RNAV/RNP CDA



Route Design Considerations

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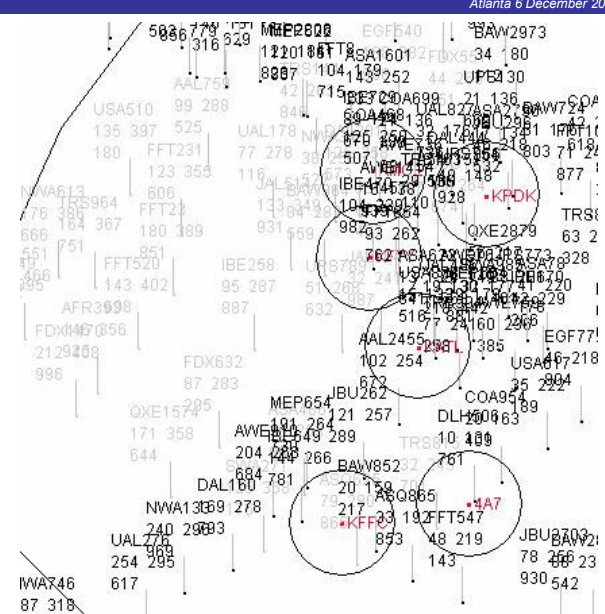
NASA Airspace Systems Program Super Density Operations Project

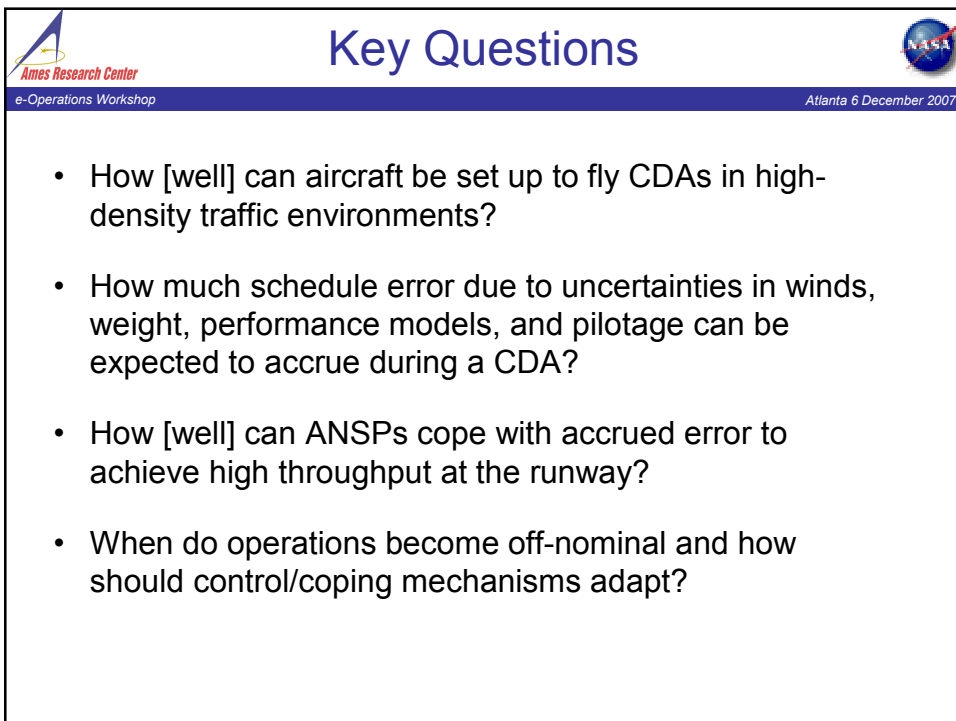
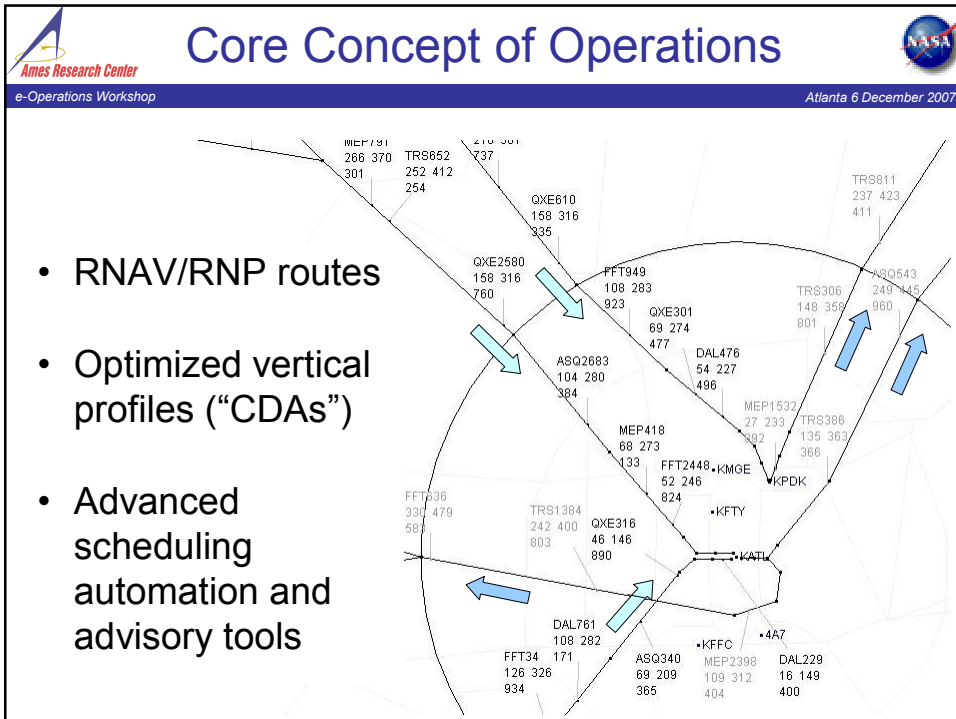



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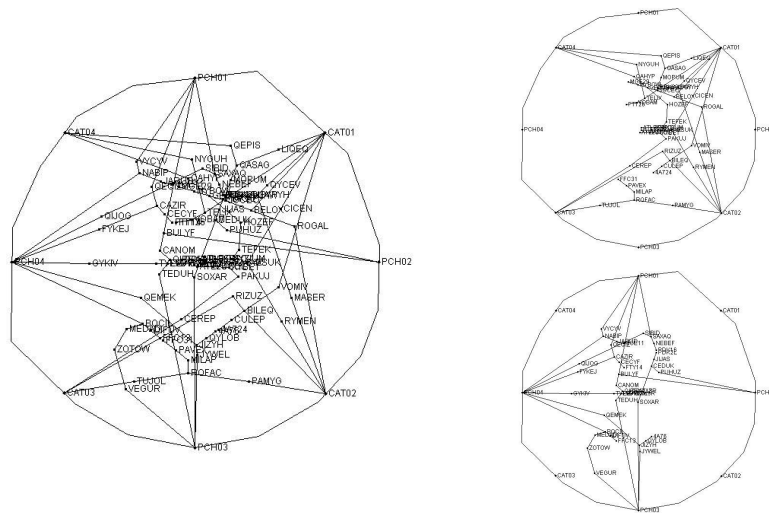
Overview

- Core Concept of Operations
- Route Design Issues
- Fast-Time Simulation Research
- Extension to Far-Term Concept

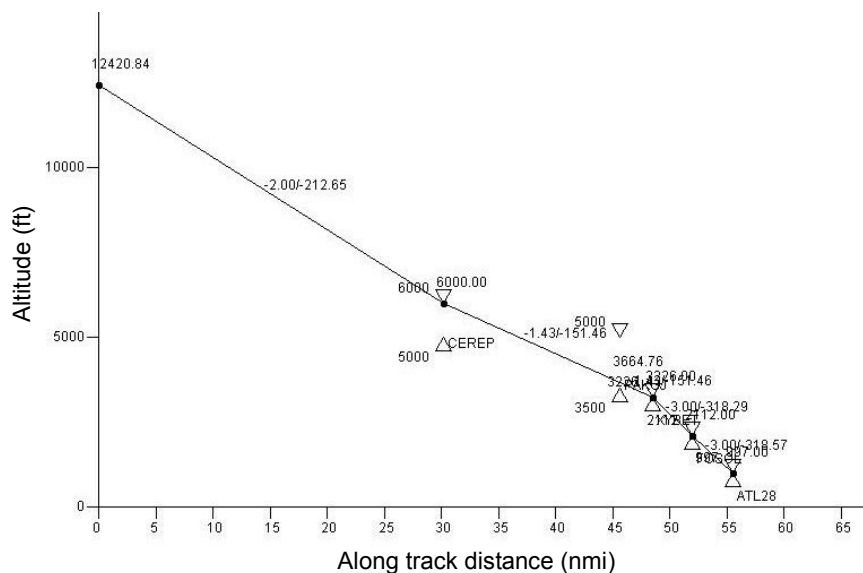


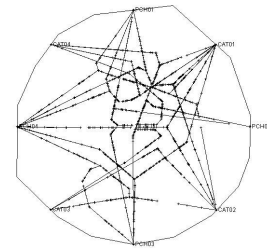


RNAV/RNP Route Design

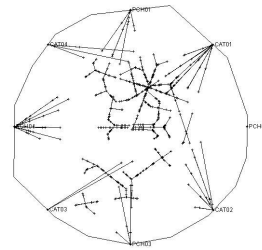


Reference Profile Generation

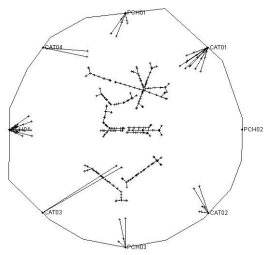




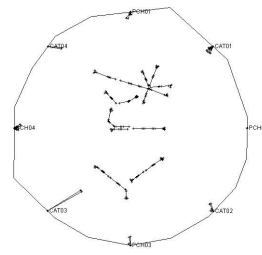
RNP 2



RNP 1

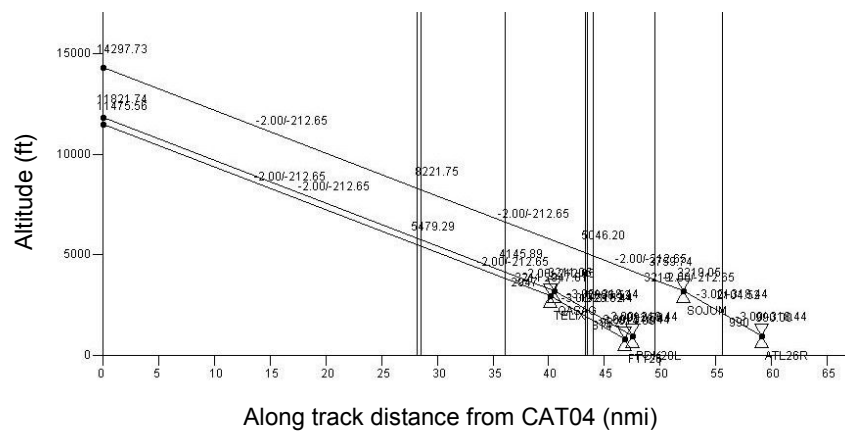


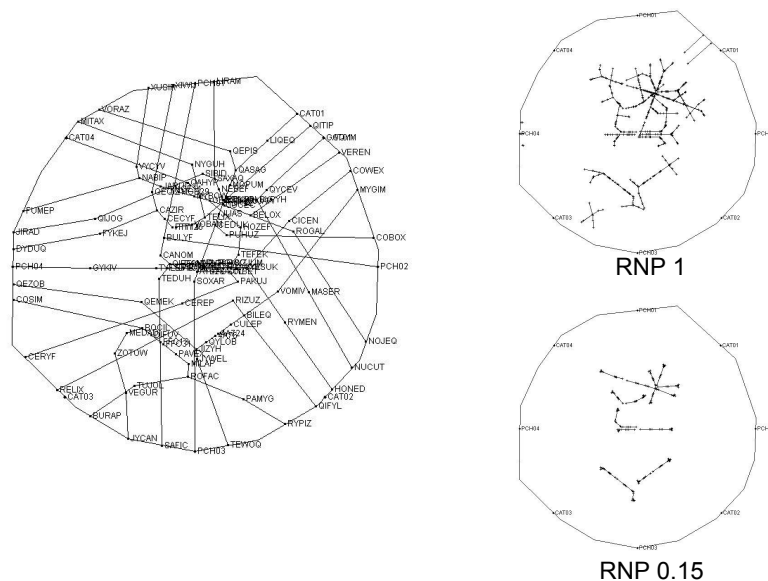
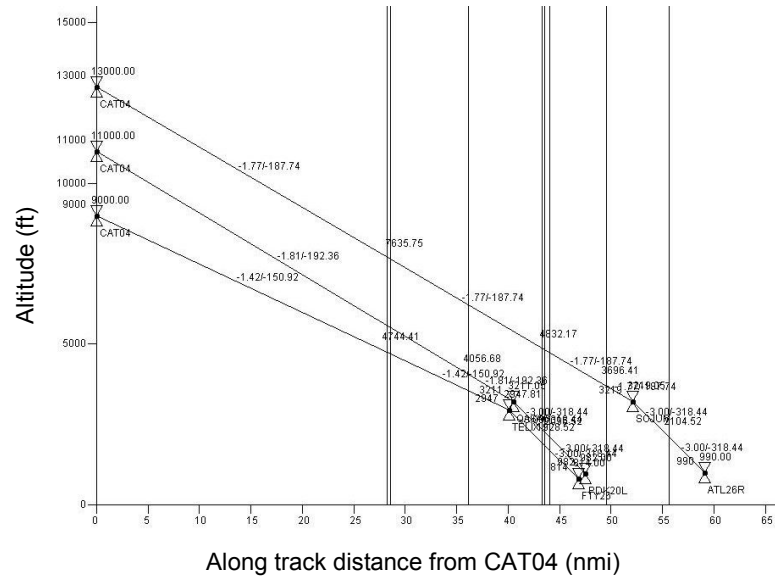
RNP 0.3

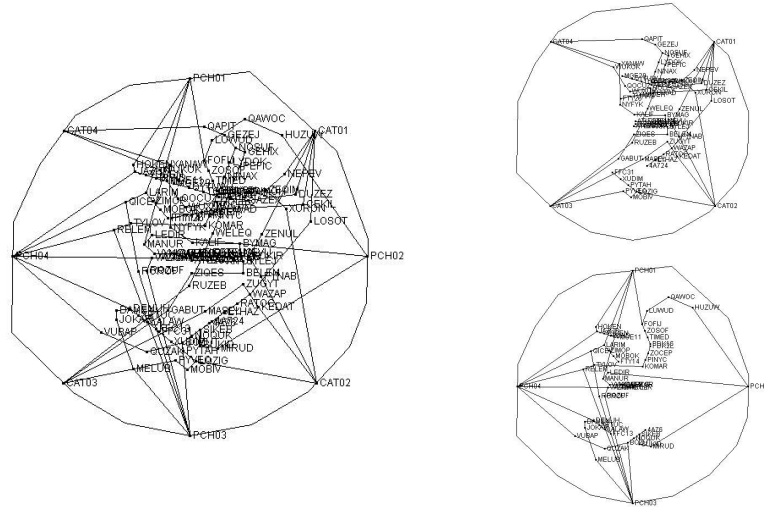


RNP 0.15

Reference Vertical Profiles







- Iterative process to address progressive increases in:
 - traffic density
 - terminal-area automation tool capabilities
 - airspace and route flexibility
 - manageable uncertainty
- Controllability analysis
- Controller 'agents'
- Prototype tools
- Noise/Emissions analysis
- Faithful descriptions of observed/modeled uncertainties

Definitions

- **Metroplex:**
 - Collection of airports serving a metropolitan area
- **Metroplex Configuration (MC):**
 - Collection of runway configurations at each metroplex airport suitable for specified winds at each airport in a given time frame, together with a set of RNAV/RNP routes to/from “pitch/catch” points to/from runways
- **Pitch/Catch (P/C) points (Terminal-Area Entry/Exit points)**
 - Points valid for transitioning to/from the en route environment during a given time frame
 - Metering points on (extended) terminal-area boundary
 - Runway-specific or multiple airport/runway
- **Operationally Viable MC:**
 - *Deconflicted* RNAV/RNP routes with optimized descent profiles and controllability characteristics identified

Far-Term ConOps Sketch

- MC ‘Alpha’ is current until XX:YY Zulu
 - ‘Alpha’ P/C points and routes to/from runways in use at metroplex airports
- **Metroplex Traffic Manager (MTM)**
 - Works ‘Bravo’ MC given winds/WX forecasts with coordination from Towers (local demands)
- **AOC/TMU/MTM recondition flows to P/C points using Bravo schedule**
 - Identify last Alpha A/C & Bravo sequence to/from each P/C point
- **Bravo changeover time broadcast**
 - ‘Sweet spot’ between prediction uncertainty and time horizon
- **Bravo routes uplinked**